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# NATURE TRAILS

## AN EXPERIMENT IN OUT-DOOR EDUCATION

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FRANK E. LUTZ
CURATOR, DEPARTMENT OF INSECT LIFE

MISCELLANEOUS PUBLICATIONS NO. 21
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY

SECOND EDITION

NEW YORK
1931

The Nature Trail work initiated by Dr. Frank E. Lutz at Tuxedo has been transferred to the Nature Trails and Trailside Museum at Bear Mountain, where the trails can be seen in operation. The Station at Tuxedo has been discontinued.

A portion of our Nature Trail with its flickering lights and shadows; the music of the nearby brook; the woodsy odors; the "feel" of out-of-doors; and, along its sides, interesting hints concerning the joys of knowing at least a little about the things that are there.

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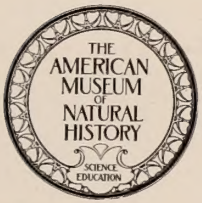


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# NATURE TRAILS—AN EXPERIMENT IN OUT-DOOR EDUCATION

FRANK E. LUTZ
Curator, Department of Insect Life

Through the courtesy of Palisades Interstate Park and of Mr. W. A. Harriman, the entomological department of the American Museum of Natural History was granted the use of about forty acres of woodland and meadow in the Ramapo Mountains near Tuxedo, N. Y., about forty miles from New York City. There, aided by gifts from a number of friends, we established in 1925 a Station for the Study of Insects but we devoted our first season to an experiment in teaching about nature in general, with relatively little reference to insects and no research concerning them. It is this experiment, the "Nature Trail," that is discussed in the following pages.

## I

**The Underlying Idea**

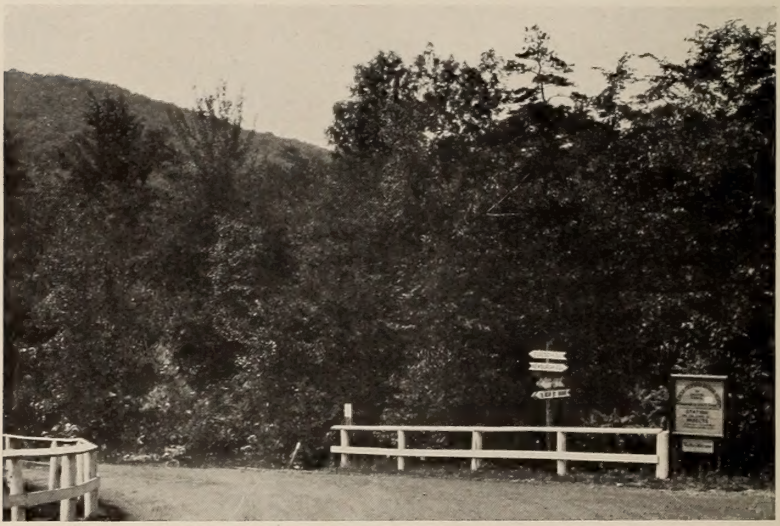
As a matter of fact we had two Nature Trails. They were simple paths through the woods, each about half a mile long and roughly circular. One we called the Training Trail and the other the Testing Trail. Some newspapers in trying to tell about our experiment called it an "out-door museum"; others, either influenced by the name of our Station or impressed by the insect part of our Training Trail, called it an "insect zoo." It was a little of each and yet neither. The underlying idea, the spirit of the Training Trail, was expressed by a sign at its entrance as follows:

A friend somewhat versed in Natural History is taking a walk with you and calling your attention to interesting things.

A "museum" has come to mean (to me, at least) a massive building to which things are brought and in which they are stored. It is "bringing the mountain to Mahomet" and, in spite of painted background and wax accessories, the mountain when displayed therein seems out of place. In our Nature Trail Mahomet went to the "mountain" and saw it alive and in its proper place. There one could not only see what a thing looked like but one could touch, smell, taste, or listen to it as well. Our experiment was not an "insect zoo" because a zoological garden displays animals far from their natural home, and furthermore, although we ourselves were primarily interested in insects, we admitted

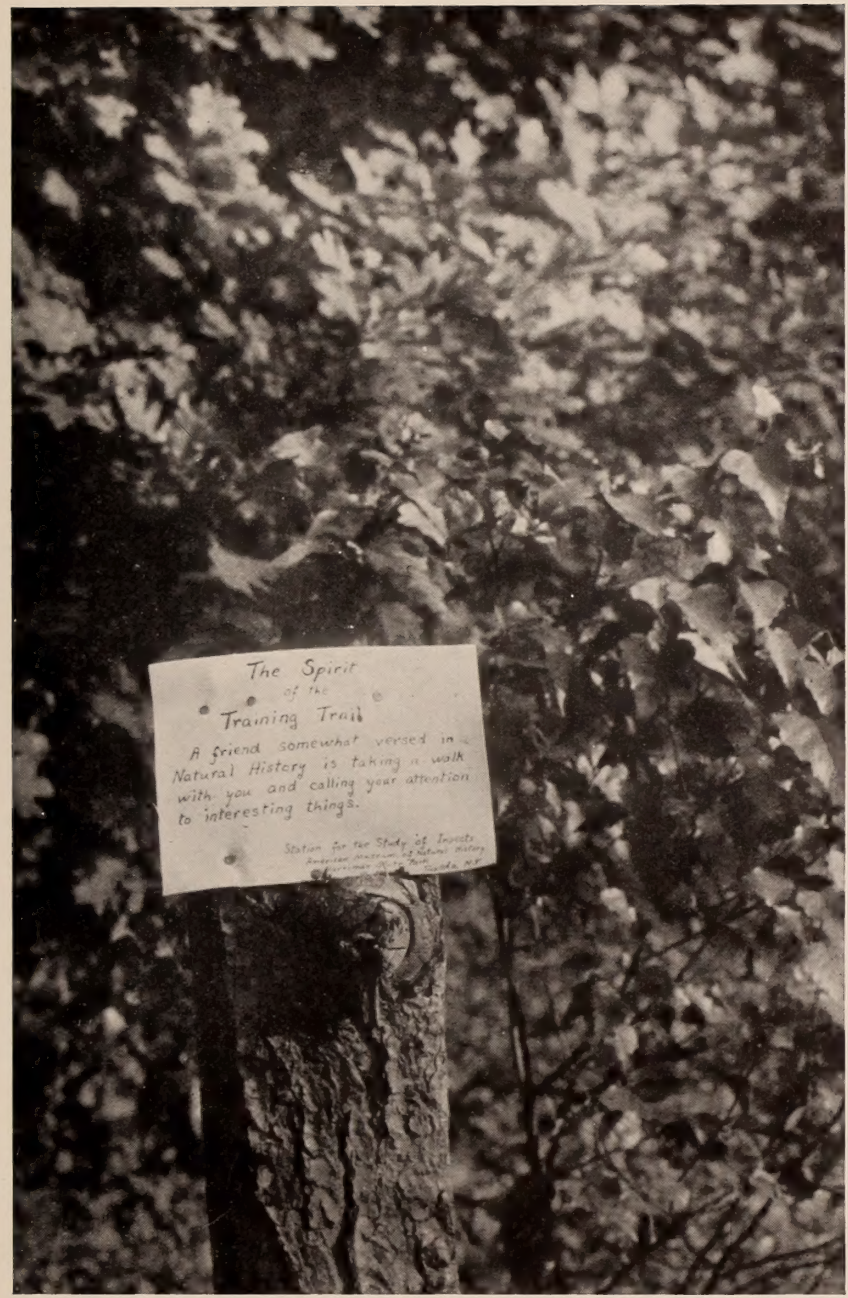
that there are other things in nature and we actually gave more attention to these other things than we did to insects.

An "outdoor museum" is the oldest type, for the first "museums" —places dedicated to the Muses—were pleasant groves where the interested walked and talked. When time permitted and our visitors so desired, we were glad to walk along the Trails with them but the "friend" of our sign talked by means of small labels that called attention to the interesting things along the way.



The entrance to our grounds from the Bear Mountain road and the sign that said "Visitors Welcome."

The Training Trail had several features that are not usually present in botanical and zoological gardens. For one thing, the labels were more "chatty" than many scientific institutions think is compatible with dignity. Then, although few of the visitors realized it, the labels were so written that a given subject was opened simply, became more complex, and was closed by a short summing-up or by a few questions. Such an educational method was possible because the visitors (at least on their first visit) went along the Trail in the "right" direction and they went in the right direction because the start of the Trail was very evident, but the end, a few feet from the start, was arranged so as to be hidden by trees. Experience had taught the need of some such device




The "why" and the "what" of the Training Trail.

if a definite continuity was to be kept in our story. In the Insect Life Hall of the American Museum, where we numbered the exhibits so that the visitors would look at them in a proper sequence, most visitors totally disregard these numbers and the thread of our discourse becomes badly tangled.

Returning for a moment to the labels, not only were they chatty and written in a language that ordinary people could understand, a language that was sometimes almost colloquial, but here and there we had "asides" having nothing very directly to do with natural history. For example, there was a quotation from Burroughs on "walking" and, where the Trail first met the babbling Wild Cat Brook, we had the following from Stevenson.

> There's no music like a little river's. It plays the same tune (and that's the favourite) over and over again, and yet does not weary of it like men fiddlers. It takes the mind out of doors; and though we should be grateful for good houses, there is, after all, no house like God's out-of-doors. And lastly, sir, it quiets a man down like saying his prayers.

We did not tell our visitors to keep quiet—in fact we wanted them to enjoy themselves, just as a radio advertiser wants his audiences to enjoy themselves—but that quotation was appropriate in any case and, if ever so little it put a visitor in a more reverential and attentive mood toward nature, it was well worth while.

In fact, some of our labels were deliberately intended to put our visitors in a good humor. For example, at the place where we were showing centipedes we asked: "Have you heard the following bit of good psychology?"

> A centipede was happy quite until a toad in fun
> Said: "Pray, tell me. Which leg moves after which?"
> This raised her doubt to such a pitch
> She fell excited in the ditch
> Not knowing how to run.

With that thing from the Greek,

> Happy are cicadas' lives
> For they all have voiceless wives,

put at our "Insect Orchestra" we not only rarely failed to get a laugh but we clinched in peoples' memories the fact that only male insects produce sounds that we ordinarily hear.

If you were a "friend taking a walk and calling attention to interesting things," you would not deliver a pedantic lecture; neither would you adopt the style of a "barker" on a sight-seeing car. You would be

natural and, though expecting and getting attention, you would have your little jokes and make yourself generally agreeable. That is what the "friend" on our Nature Trails tried to do.

## II

**The Training Trail**

Our Training Trail had four main sections and, for convenience in referring to them, each section was given a letter.

The first, or A, section, while somewhat general, was chiefly concerned with botany. A label told the visitor that on it would be pointed out

Sugar and Red Maples
Our Two Kinds of Hornbeams
The Two Great Groups of Oaks
Witch-hazel and True Hazels
True Solomon's Seal and False
The Five Kinds of Hickory
Butternut and Walnut
Blueberries and Huckleberries
How to Recognize an Ash Tree
Various Mushrooms.

The second, or M, section was devoted to "moisture-loving" things like ferns, aquatic animals (including insects as animals, though that is a difficult idea for many people), and so on.

Leaving the M section, the visitors were told that

Along the N Section There Are
Voiceless Wives.
Insects that Seem to Pray but Really Prey.
Wasps that Make Trees Work for Them.
A Viceroy that Mimics a Monarch.
A "Tiger" Lying in Wait
And Other Interesting Things.

The N section dealt with entomology.

The final, or H, section asked "How much have you learned?" It summed up the chief points of the other three. Tags were used in pairs. On the tag that covered its mate was a question and, since this was not the Testing Trail but a part of the Training Trail, the answer to that question was given on the covered tag.

Some of our visitors—not many, but a few—noted that the letters for these sections taken in order were A. M. N. H., the initials of the American Museum of Natural History. Those that did not notice it

missed it and no harm was done; those that did notice it were pleased at their acuteness and good was done, for "we aim to please" and "a satisfied customer is our best asset" are as true in "selling" natural history as they are in selling soap.

A typical portion of the Training Trail at the end of the season. Notice how narrow it is.

III

**No Vandalism**

What about vandalism? We opened up a pleasant walk, leading it past interesting and beautiful things. Out on the automobile highway we put a large sign telling what we were doing and saying "Visitors Welcome." The visitors came and they were largely city boys and girls out for a holiday. We had no policemen or human guards. What was that trail like after it had been tramped by thousands of such feet? Well, at the end of the season that trail, where it was a trail and not originally a woods road, was in no place more than eighteen inches wide.

I know of only one case of picking flowers along the Trails during the whole season and that was a grown woman who picked a cardinal

flower and was reprimanded by her small boy for doing so. I was working in the bushes out of sight and decided that the boy had left nothing for me to say even had I wished to remark. People did take flowers, whole arm-loads of them, from other parts of our ground but they were people who had not been on the Trails, people to whom the opposite idea—the idea of conservation—had not made a sufficient appeal.

There were a spring along the Trail and two places where people were invited to eat their lunches. We had no janitor for our grounds and did not need one. As a matter of fact, we did not even have containers for paper and lunch-garbage, although we should have had them in order to accommodate our public. Still, only one lunch-party that had been along the Trails left unpleasant evidences of its visit. Occasionally we picked up a piece of paper but it almost seemed as though it had been dropped by accident rather than either through intention or even plain thoughtlessness.

These things surprised me as much as my account of them is probably surprising you; and I can not explain them. I cannot think that we were entertaining only angels. Furthermore, there was a noticeable difference between the actions of those who were going around the Trails and those who, not knowing the Trails were there or not caring, had just come on our grounds as they would on any other part of the Park. To be sure, a large percentage of those who visited the Trails were children and campers. That may have had something to do with it or there may have been something about the Trails themselves that brought about this much-to-be-desired result.

What we called among ourselves "police tags" were not really such; they were still the "friend." The following are samples.

Help to keep this Trail narrow. Go single file and keep on the path.

Why kill moss by pulling it up?

A Good Woodsman keeps to the Trail. A Good Scout does not spoil plants others will want to see.

Are you stepping on a plant?

Making this Trail for you has been hard work for us. You can help by not stepping on plants.

If you see people doing what they ought not to do, please speak to them about it for us.

At one plant with a fine seed-capsule was a tag reading.

A moccasin flower's children (its seeds) are here safe and sound. See the plant a little farther along the Trail.

and there, where there was nothing but leaves, was a tag that said

LOST.—A plant's children (its seeds) when somebody picked a flower.

In spite of the complete absence of plain "don't" and the fact that plain "do" was rare, some thought we were harsh when we referred to the destruction of "ground pine" and other wild evergreens "to make a Christian holiday" or when, going along the trail, they saw a tag asking in relatively large letters "Are You a Criminal?" The next tag (both being hung on the same laurel bush) declared that

Laurel is being rapidly destroyed by criminals who break it for a few hour's selfish enjoyment of its flowers.

So much for the taking of things. As for the leaving of others, we noted that

Paper and garbage do not improve the landscape.
What you leave we must pick up

and so on. We stuck a stick through one piece of paper which I happen to know had been there from the year before, pinning it to the ground and bearing a tag with the remark

Somebody was careless. Were you?

The spring worried us a little and we decided to be somewhat forceful there. So, at one time or another the "friend" said

It is far more sanitary to use your own cup.
Treat Nature's water-pitcher as you would Man's if you were a guest at a public dinner.

and similar advice. Once, when there was a tag placed close to the water and asking

Would you put your mouth in my soup? No,

I happened to see a scout master, who was going around with some boys, flop down full-length on the ground plainly showing them how a real he-man would drink from a spring. The tag was then right in front of his eyes and, though he suddenly looked quite sheepish, he did not follow his original intention of drinking as a sheep does.

Well. I do not know why our visitors had such good manners on our Trails in 1925 and we can scarcely hope that it will ever be entirely thus but—still—who knows? Perhaps if you "jolly" the public instead of ordering it about, if you explain instead of dictate, if you ask people to help and to be one with you in protecting nature, they may do it. It is worth trying at any rate, especially as the other way clearly does not work in this land of the free.

A bridge built for us by Boy Scouts from Camp Kanohvet. It carried the Training Trail across Wild Cat Brook.

## IV

**Labels and Landscape**

Reference was made above to putting tags on a laurel bush. Do labels "spoil the landscape" and, if so, are they objectionable? Evidently there is a difference of opinion on these points. This winter a club of Evander Childs High School teachers secured permission from Dr. N. L. Britton to put a Nature Trail in the N. Y. Botanical Gardens and they did so. Another organization, I was told, approached another botanical garden for the same purpose but was refused because that garden permitted no labels of any sort. Personally, I am ignorant of any better purpose to which a living tree can be put than to educate people about trees.

As to natural landscapes in areas that are not set aside for some mysterious purpose higher than education, I think that neat labels are not objectionable except to the chronic objector. In the first place, even the most vigorous worker will label only a small part of it. In the second place, there are many people (and among them are those whose opinion I value most highly) who thought that our labels did not "spoil the landscape" on our grounds, although I admit that in places the Trail suggested trees decorated for Christmas.

Some even thought that our labels were too inconspicuous, fearing that visitors would overlook many or would not take the trouble to read the rather fine print on those that they did see. All of which showed that we were somewhere on middle ground and, so, probably about where we ought to be.

For the most part, we used linen tags for labels after experimenting with other methods, as will be told later. These tags were about an inch and a half wide and two or three inches long, with an eyelet at one end. They were usually fastened with string—almost always with string when fastened to a living plant—and, of the approximately two thousand labels and signs that we put out in 1925, not more than two or three were tacked to trees. In those exceptional cases relatively small tacks were used on trees with relatively thick bark. I think that nature suffered little from our labels.

V

**Advantages of Short Labels**

It will be noted that most of our labels were small. Even if they had been larger, we would not have put more words on each. Usually none but the exceptional person, the sort of person that we do not need to interest because he is already interested, will read a long label. If you have much to say about something, say it on the continued story plan. The most blasé visitor will read a short, snappy label. In fact, if it is short enough and clear enough, he will get it at a glance without really intending to read it.

Of course, we should not entirely disregard that exceptional person who is willing to read a long label. Perhaps he is the sort that gets ideas better when they are presented all at once. For that reason we had here and there long labels in which scattered facts that had been told separately were brought together. Furthermore, since such long labels were few, even the blasé individual was apt to think that perhaps they were especially important and, so, worth a moment's attention.

There were cases where a fairly long story had to be told all at once or not at all. In some of these cases we resorted to tricks, believing that the end justified the means and probably unconsciously taking a tip from the "columnists." For example, in keeping our promise to show "wasps that make trees work for them" we put at a place where there was an "oak apple" growing alongside of the Trail a horizontal string and on it we hung seven tags side by side. It was the only place on the Trail where such a thing was done and, as was intended, attracted attention. Most people naturally read the left-hand label first and, seeing numbered "chapters," few stopped until they had read the full "Story of the Oak Apple." As we had it, it was as follows:

The Story of the Oak Apple

I.—A small wasp laid an egg in a very young, not yet fully formed oak leaf.

II.—That leaf, instead of growing into an ordinary leaf, became the curious and complicated "oak apple" that you see here.

III.—The young wasp that hatched from the egg lived in the center of the "oak apple" and fed there.

IV.—Why did the oak leaf become an oak apple?

V.—The change was good for the young wasp but how did it or its mother force the oak to do it? We do not know.

VI.—What advantage did the oak gain? None that we know. We still have much to learn about even common things in nature.

To be sure, much more could be said about oak apples but that was probably enough for the first lesson, and the most important part of the

lesson is that even scientists still have much to learn about nature; much that is fascinating and may be important. I really would like to know what happens in the formation of galls such as "oak apples" and whether it has any similarity to the unknown cause of the formation of human tumors. Perhaps the Station for the Study of Insects may be able sometime to study this.

Another example of a divided label was at an old ant-nest. Early on the Trail there was an active colony of the Alleghany Mound-building Ant. Attention was first called to it by an open box hung in a nearby bush and labeled an "ant feeding station." In that box we kept sugar, dead insects, and other delicacies. The ants were large enough to be easily seen and hungry enough to be always present, making a rather good show. At the nest it was explained that the ants make the large mound and keep it clear of grass so that it will catch the heat of the sun and act as an incubator of young ants. It was also noted that farther along the Trail a different condition of affairs would be shown. The place where this promise was kept was really so much farther along the Trail that some may have given it up, if they remembered it. But, whether they remembered it or not, they finally came to a place where the Trail swung a half-circle around a mound about two feet in diameter. We drove a tall but thin stake there, partly to suggest not stepping on the mound but also to hold these four tags one above another:

A DEAD CITY. Deserted by Its Founders

This city was started about 30 years ago by a queen ant, *Formica exsectoides*, the Mound Builder.

The workers heaped up sticks and pebbles in what was then an open spot to catch the sun's rays and keep the young ants warm.

Then plants grew up and shaded the mound; moss covered it; and the huge population of this once busy colony died.

How did we know that it was thirty years ago? How did we know that the spot was then an open one? We did not tell. Those who could not guess were impressed with the fact that there was still something for them to learn; and that was good. Those who looked around and noted that none of the trees were more than thirty years old had part of the explanation and were much pleased with themselves. That also was good.

Do not tell too much. If you do, you will get very little across, and but little of what does go will be remembered. Furthermore, you risk giving the impression that there is nothing more to be known. If possible, get people to feeling that they would like to know more. Also,

frankly confess that even you do not know it all. That will establish a common bond of both ignorance and desire to find out. People like to know about mysteries and to solve puzzles; it interests them, and that makes it worth while; if they become interested enough in the puzzles of nature to engage in research themselves or to help support the researches of others, science will gain an additional benefit.

## VI

**Scientific vs. Common Names**

The scientific name of an ant was mentioned, and this suggests another problem. Shall we use scientific names? That question receives a decided "No. Never in popular work," from some and an equally decided "Yes. Nothing but." from others.

Several days ago I gave an hour's talk about insects to an audience of school teachers. At the end I called their attention to the fact that I had not used a single scientific name in the entire hour. They seemed delighted.

In the introduction to a book on insects I told about an experience at the American Museum when

> We were once severely criticized by an excitable visiting school-marm because we had labeled a number of exhibition specimens with their scientific names but had neglected to give English names to them. I had been trying, for some time, an interesting experiment on several children with whom I had been rather intimately associated (they were my own). The first move was to tell one of them that the name of a certain burly bee she saw in the garden was *Bombus*. About a week later there were near-tears because a neighbor insisted that it was a Bumble-bee. Matters were smoothed over by explaining that *Bombus* was the real name for such bees and Bumble-bee was a nickname. There are thousands of kinds of native born, United States insects which have been really-named but not nicknamed. I have made an effort in this book to record the real names correctly and have given the nicknames when I knew them; when I did not, I usually have left you the pleasure of inventing new ones.

That is what we did on our Trails too. Incidentally, some of my fellow entomologists have dug up an older scientific name than *Bombus* for bumble-bees and they say the "real" name is really *Bremus*, but in America the nickname is still Bumble-bee and will be to our children's children. On the other hand, it is Humble-bee in England, and so there you are.

Miss Edith M. Patch, who has written very successfully for children about insects, will probably not mind if I quote from one of her letters an additional idea on this subject:

As for the name, I do not find that children object to a long, strange name. I think most children find both the length and the strangeness somewhat fascinating. Publishers, teachers, and librarians who "pass" on diction with reference to "grade," however, object in no uncertain tones.

I guess that common sense should be our guide in this matter and, if one gives both kinds of names, the scientific one comes to be associated in peoples' minds with the common one. The common name becomes a link between what they already know and what we would like to teach them.

The garden enclosed by woods through which the Trails ran and backed by what each one of us individually called My Mountain.

VII

**Selecting Topics and Presenting Few**

The suggestion made above about not telling the people so much that they remember but little and have no appetite for more referred to telling too much about any one subject. I think that the same objections apply to presenting a great many subjects at one time.

Our Nature Trails in the Harriman State Park section of the Palisades Interstate Park were laid out so as to pass the most interesting things that we found there but we

made no effort to lead them to everything in even that limited area. There was enough as it was—more than enough.

To be sure, we did plant a garden in order to show the injurious and beneficial insects of a garden but to reach this garden the visitors took what was said on a sign to be the "garden detour." We did not encourage them to take the detour and, in fact, toward the end of the season we removed the "detour" sign so that any one who went there did so on their own responsibility and initiative. This was not because the garden was neither interesting nor instructive but because it added so many subjects to those treated on the wild part of the Trail that we had too much. The garden was really both interesting and instructive. I felt that the days of hard manual labor that I and others spent in the hot sun planting and tending it were repaid by having one bright little chap open his eyes in wonder at learning that potatoes did not grow "on bushes" above the ground "like other things."

Then, too, we had an exhibit of household insects that did not really belong on a Nature Trail out in the woods. By putting that exhibit in a tent, we tried to give our visitors the feeling that it was not a part of out-doors without insulting their intelligence by telling them so. The tent served several other purposes also. In the first place, it could be seen by people coming on the grounds and they naturally went to it. In doing so they walked past the trees that hid the end of the Training Trail and were in position to start at the beginning of it, thus going around the right way and permitting us to arrange their course of instruction in a regular sequence.

In the second place, it housed the desk of a docent who was there to answer questions, to act as instructor for groups that wished more instruction than our labels gave, and to score the papers of those who took the Testing Trail.

Furthermore, I suppose the exhibit of household insects, like the "common names" of species, was to the visitors "a link between what they already know and what we would like to teach them" about insects, although it was surprising how many saw there live bed-bugs "for the first time." Our thanks are due to Sutherland's "Book of Bugs" for a quotation that we used to help take the curse off of at least one exhibit that might otherwise have been entirely disgusting to some:

> If the test of nobility is antiquity of family, then the cockroach that hides behind the kitchen sink is the true aristocrat. . . . Man himself is but a creature of the last twenty minutes or so compared with the cockroach, for, from its crevice by the kitchen sink, it can point its antennæ to the coal in the hod and say: "When that was being made *my* family was already well established."

This rather amused many and definitely impressed them with the antiquity of insects.

But, to return to the matter of picking out just a few subjects for attention and being careful not to have too many, we did not attempt even to name every sort of thing that grew along the Trail and we did not merely name anything. Nothing is to me more barren than a mere name. This seems so important that I will discuss it a little later.

There were fourteen different kinds of ferns that grew near the spring in the M section. This was such a large proportion of all the kinds to be found in the Park that we labelled them all but we also gave the following advice.

Fourteen kinds of ferns are growing naturally within 100 yards of this spot and are shown here.

If you do not have time to learn 14 kinds of ferns, we suggest that you know at least four, say:

Christmas
Maidenhair
Sensitive
and Royal

At first we picked out things that we thought worthy of attention and that were easy for us to treat. With all out-of-doors to choose from, it seemed good business to pick things that were easy for us, if they were also worthy of attention. Other things being equal, a matter that a naturalist must spend much trouble to look up is probably a matter that can be omitted from elementary education in natural history without much loss.

Having made the first selection and written on the labels the "friend's" remarks, we made note of all of the questions that we were asked and immediately—usually, at least, before the end of that day—had the label "friend" primed to tell the answer to those questions without being asked. Possibly, it might not occur to other visitors to want the answer to these particular questions but there was a good chance that what interested one person enough to lead him to ask the question would interest another enough to want the answer.

I hope that I may be forgiven for another thing that I did and, had it not been so helpful to us, I would not tell. As has been said before, the Trails were roughly circular. Frequently nature councillors would come with groups from camps in the Park and usually even individuals had people along to whom they talked. Inside of the circles formed by the Trails there were all sorts of cross-paths known only to us. Finally,

voices carry far in the woods and a man moving carefully can be seen through bushes only with difficulty. There you have the plain facts and you can guess the horrid one that I prowled around inside of the circles listening to the remarks made by our visitors and noting the mistakes made by even nature councillors. Every mistake that I overheard a person make called for a statement to the contrary on the Trail. I do not mean that I rushed out and told them that they were wrong. What I did was to take a blank tag out of my bag, write a label, put it on the Trail after the party had passed, and then take an inside short-cut to a place where I could listen and learn some more. I learned a lot, too.

So the season passed, taking down things that did not seem to serve their function of interesting, and putting up things which would both interest and educate, but always striving not to have so much that the average visitor would be confused or get tired.

## VIII

**Teaching More Than Names**

About that "nothing is more barren to me than a mere name." I am a museum curator, and museum men are supposed by some to spend their lives collecting and naming things. If that were my only work in connection with the museum, I would resign and do something that interests me more. I admit the necessity of having names for everything and the desirability of being able to apply them correctly and without hesitation, but, as an end in itself, it seems to me futile. Perhaps I have inherited what may have been Adam's reaction to the work he was given to do in the Garden of Eden. Perhaps my reaction arises from the fact that I do such work poorly. Whatever the cause, I do not get much "kick" out of a label on an exhibit of either an animal or a plant when that label tells me no more than just a name.

Possibly this personal prejudice has something to do with my objection to the stressing of making named collections of things as a prime prerequisite to the awards of various kinds of merit badges to boys and girls. I would a great deal rather have the children watch a doodle-bug and be able to tell what it does than to have them collect the doodle-bug and then get somebody to name it for them—twenty-five kinds of doodle-bugs for a merit badge.

I selected doodle-bug as an illustration knowing full well that if a child talked to me about a doodle-bug I would not know what he meant unless he described it and its actions, for "doodle-bug" is a name that

means different things to different people and in different parts of the country. That, of course, is an argument in favor of working to get correct names, especially definite, scientific ones. But my point here is that mere naming does not seem to me to be the right approach to people whom we wish to interest in natural history.

We are all somewhat childish and Helen's Babies were real children when they begged their uncle to open his watch so that they might "see the wheels go 'round." They did not ask the names of the wheels; it was action that they wanted. I admit that a child's first question is apt to be "What is that?" but I am equally certain that he or she is going to be much more interested in what "that" is doing, if anything; in how it got there and what will become of it; in how it differs from other things; in whether it will hurt one or whether it is good for something; and so on.

After all of this, the reader has a perfect right to ask for samples of what I mean by labels more interesting than mere names. While such a request is quite fair it is rather embarrassing. However, I will meet it by quoting some that were most difficult for us, knowing very little about botany. Some day some botanical Fabre will make plants really live for us; it is badly needed. As it is and we being chiefly entomologists, the botanical wheels whose movements appealed most to us were those that meshed with entomological ones. Furthermore, it seems to us important to show that all nature is interlinked. So, one of our first labels on the Training Trail (and a long one) was

OLD MAIDS ARE THE SUPPORT OF THE BRITISH EMPIRE

"Old maids keep cats. Cats destroy field-mice, which prey upon bumble-bees' nests. Bumble-bees insure seeds to red clover. Red clover makes good beef. And good beef makes big, strong men, who extend and keep up the British Empire.—Q. E. D."

This label was put at a clump of red clover. Nature supplied the bumble-bees and the visitors furnished examples of some of the other things.

In connection with the witch-hazel we showed how it may be distinguished from other shrubs; pointed out the large cone-shaped galls which are so often to be found on its leaves and that these galls were made by the plant in response to some unknown impulse given to it by a particular kind of plant-louse; mentioned the use of witch-hazel in medicine; and told about the superstitious use of twigs from European (occasionally American) witch-hazel as divining rods. Of course, all of this was not on a single label and some of the points were made

The mark which the now dead "climbing bittersweet" left on the trunk of a hornbeam.

several times in differing language and in various connections. Thus, the asymetrical leaf-base of witch-hazel was referred to when we mentioned other leaves having an asymetrical base.

A good illustration of how we tried to hammer in by reiteration some particular point got to be quite a joke at the Station. In my behind-the-bush eaves-dropping I discovered that nearly every nature councillor in the Park was teaching the youngsters that American Hornbeam is Hop Hornbeam. Now, one may not care much for names and still get rather excited over wrong ones, and we certainly did go after that wide-spread error. Samples follow:

This is an American Hornbeam. It has smooth bark. Hop Hornbeam has flaky or scaly bark.

This is American Hornbeam. It is sometimes called Blue Beech, but that is not good, as it is not a beech. It belongs to the Birch Family.

The Birch Family (Betulaceæ) includes Birches, Hornbeams, True Hazels, and Alders.

This tree is American Hornbeam.

This is American Hornbeam. It is not the Hop Hornbeam. The latter has scaly bark and is often called Ironwood.

This is American Hornbeam. How does it differ from Hop Hornbeam?

Hop Hornbeam or Ironwood. Notice the rough bark.

Why is this not Hop Hornbeam? Answer.—It has smooth bark. It is American Hornbeam.

This is American Hornbeam. To what Family does it belong?

Maybe we over-did it but we tried to make certain that it was at least done.

In connection with these hornbeams, a place where a now dead but formerly tightly twining "climbing bitter-sweet" had left a deep spiral indentation in one of these miscalled "ironwoods" interested many.

Perhaps one more illustration of how we tried to get people to realize that plants are really alive and more than just pretty things with names will be enough. A scrawny little Juniper in the deep woods was labelled

This Juniper is "out of place." Junipers usually grow in the open, and you notice that this one is not doing well. However, it got a start and is trying hard.

## IX

**"Tactile Education"**

Perhaps because we knew more about them, insects—live insects—seemed the easiest to make interesting and with them we tried an experiment in tactile education. "Visual education" has come to be quite the thing, but this was tactile education.

You know how, when you see something new or interesting, you like to put your hand on it. I have even seen people who were looking

at a building walk up and touch its sides. Some parents and teachers so often say to a child "Don't touch" that the saying of it gets to be almost mechanical. The child is merely using a natural and efficient method of learning about things. Watch yourself and note how often you pick up an object you are looking at although you could get an equally good visual impression of it where it was. Our experiment was to see if the public could be trusted to handle exhibits, so we had no "Hands Off" signs.

We did not encourage visitors in every instance to touch the actual insects we were exhibiting, although they could do so if they wished, but we did suggest that they pick up the containers or that they lift the cover in order to get a better view, merely requesting that things be replaced carefully. Sometimes we went the limit, as when we asked that certain beetles be picked out of their cage and held close to the ear so that their faint squeaking might be heard.

In the household-insect tent there was a bottle in which a large number of red eyed fruit-flies (*Drosophila*) were breeding. The label "friend" said:

> Note, by carefully turning the bottle, that these flies tend to go toward the side that is in the brightest light.

I think that the psychological effect on the visitors of doing this—and most of the visitors did it—was far more valuable than the little they learned about positive phototropism but both advantages were there.

Just beyond was another thing that gave the visitor something that he could do with his hands. It was labeled "Can you Recognize Your Friends from a Distance?" or some such thing (I have forgotten the exact wording) and was a horizontal dial with a pivoted arrow mounted on it—the same device that is used in National Parks to point out mountains. The swinging arrow pointed out trees, and labels on the board told what differential characters could be used at long range.

When exhibiting a creature that would be happier in the dark, we covered it, partly to make it happy, partly to suggest that it normally lives under cover, but partly to give the visitors an excuse to make the manual effort of lifting the cover. At the American Museum we have a long series of railing cases filled with insects. It is what I call our Noah's Ark exhibit and most visitors pass right by without stopping to look. That is, they pass all but the two cases containing moths that would fade in strong light. These cases are fitted with hinged covers and visitors' finger-nails have worn hollows around the small knobs by which

the covers are lifted. Curiosity is said to have killed a cat and it can be made a powerful aid in education; also, most people like to be doing, not just looking on.

The most daring thing in this experiment of trusting the public to handle exhibits was to put out some celluloid enlarged models of the front wings of a male cricket showing the apparatus by which it chirps. Even if it had been necessary to replace these models from time to time with

The "Insect Orchestra." The object on the nearest cage is a tin box in which were kept celluloid models of a male cricket's front wings.

new ones it would have been worth while, charging the cost to the normal cost of education, but it was not. The models were much used but not at all abused.

Does not this experience, combined with the lack of general vandalism previously mentioned, raise an interesting question concerning trusting the public? And what is the answer?

"Keep off the Grass" signs are of little avail but I know of a man who once put out a sign "I am trying to grow grass here. Please help me." And at another time "Please keep off of where grass ought to

be." He got favorable response in each case. In the first he gave a clear explanation for a reasonable appeal; in the second he called humor to his aid.

It may not always work out this way. Today I was discussing the matter with an experienced master of a boys' school who said that, if people are suddenly trusted to a much greater extent than they expect, they will not understand it and, misunderstanding, will not accept the trust; but, if they are trusted just a little more than they expect, they will usually appreciate it and show their appreciation.

It is worth trying and, as I said before, even if damage is done by handling, I believe that the educational advantages gained by touching things is worth a considerable cost of replacement.

Although a museum man, trained in a museum that has acres of plate glass shutting visitors off from the things that the museum wants the visitors to understand fully, I do not like such obstructions. In many instances a janitor with a dust-brush would be cheaper than cases as a method of keeping dust off of specimens and the specimens would be no worse for an open method of installation.

Then, there are the labels. If I could, I would have each museum label arranged so that the visitors could hold it while reading it. Each visitor could then get it at just the right distance from his eyes; having taken it in his hands, the visitor would be likely to finish reading it before dropping it; and, perhaps not lastly but certainly worth while, the label would enter into his personal experience and would not be merely something shut up in a glass case. This can not always be done in a museum but it was a feature of our Nature Trails.

## X

**Personal Contact**

Reference was made to the presence of a docent who was ready to conduct groups around the Trails and give instruction concerning points not covered by the labels. Sometimes this took on the aspect of a tour personally conducted by a "nature guide" and of formal class instruction.

If the labels are what they should be, they will tell enough and tell it in a way that is personal enough to make the presence of an actual person unnecessary. If unnecessary, then undesirable as a formal and evident part of the plan. It is undesirable simply because it is both formal and evident. Furthermore, it is like the plate glass of a museum case, something that separates a visitor, whether he be conscious of it or not, from the thing that he is looking at.

On the other hand, when possible, there should be people on the ground ready to answer questions and to supply the personal touch that even the best label can not furnish. This seems to be a contradiction of the former opinion but it is really not so, for the presence of these people need be neither formal nor evidently for the purpose of "selling goods."

Knowing that many of the visitors to our Nature Trails would be small boys, we had boys ranging in age from twelve to sixteen on our "staff." These boys learned a very great deal by the work they did and they thought that their main job was to make themselves generally useful with the mechanical chores along the Trails. They were interested in natural history but they were not selected because of their knowledge concerning it. What we wanted was to have there some real "boys' boys" when other boys came to visit us.

If the visiting boys saw that our fellows were nimby-namby weaklings they would judge us and everything that we had to show them accordingly. But if they saw a "real fellow" doing something—let us say moving a caterpillar to another branch—they stopped and took notice. If they made some sarcastic remark, they were apt to get back as good as they gave and that was a fair exchange pleasing to both sides. However, the conversation was more apt to be something like this:

"What'ja doing?"

"Moving this caterpillar to a branch with better leaves on it."

"What'ja doing that for?"

"So that it can get lots to eat, of course."

"Here's a good branch."

"Go on. That's oak and this caterpillar eats witch-hazel."

"Don't it eat nothing but witch-hazel?"

"Well. It will not eat oak."

And so on. Perhaps by this time more boys had come up to see what it was all about. Such "nature guiding," or "nature councilling," or docent service, or whatever you wish to call it gets beyond the middle-ear and retina.

For my own part, I rarely took parties on personally conducted trips around the Trail. I sometimes started out with them but then remembered something that I ought to do. "It will take only a few minutes and I will join you later," which I did when they had covered most of the Trail by themselves and in their own way. Usually in such cases questions had accumulated in their minds and these were asked one after another so that not only was time saved but there was a possibility of weaving the answers into a connected story.

For the most part, however, when I had time to be a docent I would take an inside path that would bring me out on the Trail just ahead of some visitors. They would then meet me strolling along; the "time of day would be passed"; and the conversation more or less

At the end of the Testing Trail. Scoring the boys' papers and chatting with them about their answers.

gradually worked around to a nature topic. While interest was still strong I would leave them and arrange to be accidentally met by some one else.

To say that our formal "nature guide" service was a total loss would be an overstatement but it did not seem to be very profitable. Informal service was much more useful in our experience; and one advantage of a properly labeled Trail is that it does not need even that.

## XI

**The Testing Trail**

Several references have been made to the Testing Trail. This differed from the Training Trail in that the only labels were numbered tags bearing questions. Visitors who wished to do so could write out their answers and we would score their papers on the basis of 100 points for perfection. The questions concerned only facts covered in the Training Trail and were changed from time to time—especially just before contests. There were fifty of these questions at any one time.

The contests were between groups of campers and were most interesting. Usually five individuals formed a "team" and inter-camp contests were decided by the average score of each team. However, sometimes a single team would try to beat the current "high score" of all teams and sometimes an individual would try for the individual high score. Finally, a boy from the camp of the Association for the Improvement of the Condition of the Poor made 99½. Really, I suppose we might honestly have scored him 100 but, at any rate, his remained the high score of the season.

These people worked hard on the Training Trail before taking the Testing Trail. In contrast with an average score of about 80 for *teams* of city children, some of whom were getting their first taste of real outdoors but all of whom had worked on the Training Trail, was the individual high score of 94 made by adults depending on their general knowledge.

The following questions (with answers added) are typical of those used on our Testing Trail. When two or more questions concerned the same species not more than one of them was put on the same specimen.

What shrub is this?—Witch-hazel.

For what is this shrub used by man?—To make a liniment for sprains, etc.; also twigs of it are, or were, used by certain people as a supposed aid in the location of water or gold.

What are the cone-shaped structures on some of these leaves?—Witch-hazel Cone-galls. They are caused by a kind of plant louse.

When does this bush blossom and how long does it take its seeds to ripen?—Late autumn or early winter. About two years.

Are these leaves "simple" or "compound?"—(The answer differed according to where the question was placed. A similar question concerned opposite and alternate branching).

What kind of tree is this? If not sure, name two trees, either of which you think it might be.—Butternut or walnut. (It was really butternut but the distinction between the two is rather difficult for some. However, some guessed hickory and that, of course, was wrong.)

What is a general name for this tree and why do you say so?—Ash. It has opposite, compound leaves in which the leaflets do not all come from one point.

What are the small plants growing in this clump of moss and with what are they often confused? How do you tell the difference?—They are cinquefoil and each leaf has five parts. Strawberry looks like it but has only three parts to a leaf.

Does this belong to the Birch or to the Beech family? To the Birch family, although it is sometimes called "Blue Beech."

Is or is not this plant poisonous?—It is not. (This question was sometimes put on a non-poisonous sumac; sometimes on a young butternut; and sometimes on a trefoil that looked like poison ivy. It is somewhat of a "catch question.")

Is or is not this a chestnut? Why do you say so? —No. Because chestnut leaves have bristle-tipped "teeth." These leaves look like chestnut leaves but have no bristles; it is a chestnut oak.

What killed these trees? A fungus, the Japanese chestnut blight.

What made the snake-like markings in these leaves? The leaf-mining caterpillars of a small moth.

Does man use as food any part of this particular kind of tree?—No. (This was really a "catch question." It was put on a maple but on a red maple, not a sugar maple.)

What are the white objects on this caterpillar's back?—The cocoons of small insects that fed on the inside of the caterpillar.

What are these insects and why is it important that you should know? Japanese leaf-beetles. (They were dead specimens in a bottle.) Very destructive and spreading in this direction. They should be reported if seen alive.

Most of the questions were of the "what is it" type because the answers to such questions are usually either right or wrong. When the question calls for a discussion of something there may be a difference of opinion as to the proper score. Contests or games are splendid aids in teaching but, when using them with children, one must be very careful that the children do not get a notion of unfairness. A child's confidence is easily lost.

Even with the "what is it" type of question there is a chance to point out more interesting things about "it" when scoring the papers, for comments made to the visitor at that time will receive special attention because of the interest aroused by his personal endeavor.

## XII

**Mechanical Methods**

A short description of some of the mechanical methods which we used on our Trails may help others who make similar trails, although ingenuity in using whatever is at hand is what counts most.

Labels must be weather-proof. We spent a great deal of time experimenting with celluloid. We dipped typewritten paper

in a thin solution of celluloid in acetone and other solvents. This weather-proofs the paper and protects the typewriting but the paper curls badly. One day we did not have time to treat several typewritten labels before we had to put them out. It rained that night but, when we went the next morning to replace the labels which we supposed were ruined, we found them nice and fresh. Much toil and trouble—to say nothing of celluloid—had been wasted because we had not had sense enough to find out in the first place that our typewriting ink was waterproof.

The label method that we found most useful was to write (or print) with Higgin's waterproof ink on Dennison's linen tags. These tags are expensive when bought at retail but they are cheap in lots of a thousand or so. Such labels will stand numerous hard rains but they mildew during a long damp spell. Furthermore, if they are, as they should be, handled by visitors, ordinary dirt must be expected. Some of our linen labels lasted all season but, as we wanted our visitors to believe that we considered the exhibits worthy of good-looking labels, we renewed most of the tags every few weeks.

Furthermore, many things need new labels every few weeks at any rate if we are to have the labels tell timely things. Where yesterday we called attention to a bud there is now a flower and will soon be fruit. Of course, a label could be written that would cover all three and be good for all time but it would at no time have as great an appeal to a person as a label that seems to have been written for the special occasion of that particular person's visit.

We found that it was well to write our labels when and where we wanted to put them up. A certain freshness, spontaneity, and appropriateness came in this way. Desk-written labels are apt to be desky.

To be sure, there are many labels that are always timely. The trunk of a tree is flaky, or smooth, or what-not, winter and summer. For such things it might be well to have painted tin labels. We have not yet tried them but may do so. It has been suggested that tin painted one color might be used for things to be noted in summer and another

Along the N section, showing the use of celluloid cylinders for enclosing insects on their food-plant.

color for winter characteristics. Personally, I fear getting things too complicated and formal.

We wanted to put some water-color drawings here and there to show, for example, what a caterpillar looked like before it turned into the pupa that the visitors were looking at. There are various ways of water-proofing such drawings but we found the following plan quite satisfactory. Two sheets of celluloid, each four by five inches (any size larger than the drawing will do but $4\times5$ was our standard), formed the front and back of a holder. These sheets were separated by and fastened to strips of wood that acted as the top and two sides of a frame. These strips were about an eight of an inch thick and three-eights to half an inch wide. "Liquid celluloid" (ordinary celluloid dissolved in acetone or amyl acetate) was used to fasten things together and to paint on the outside edge of the wood. Thus, the whole thing was rain-proof. The picture was slipped in from below and the opening there was closed by a fourth strip of wood that completed the frame. This fourth strip was held in place with a small thumb tack.

While this device was rain-proof, moist air could get in and the moisture condensed on the inside after sunset. This fogged the view until things warmed up the next day but did not seem to harm the drawings. One that was out all last season is still good enough to use another year. Certain colors, especially blue, fade in sunshine and this must be taken into account, especially when showing pictures of leaves. Incidentally, our typewriter ink, although water-proof, gradually faded.

Drawings made with water-proof ink are very helpful. An example of this was where we contrasted the forms of the indentations in the margins of the leaves of red and sugar maples; another was a drawing to show what is meant by an asymmetrical leaf-base characteristic of certain trees and bushes. These drawings were made on ordinary library cards and needed no water-proofing. At the top was tacked a small, neat stick that served both to stiffen the card and to furnish a secure and convenient place for the attachment of the string by which the drawing was hung from a twig.

The most extensive use which we made of celluloid was in constructing cylinders in which we kept live insects and spiders. These cylinders were of various sizes, averaging about eighteen inches long and eight inches in diameter. The edges of the celluloid roll were held in place simply by sewing them together. A muslin "sleeve" was sewed on each end of a cylinder and tying a string around each sleeve closed the cage. One advantage of this device was that it could be slipped over the end of

a branch or over a whole plant and fastened there in order to enclose leaf-eating forms. One disadvantage of it was that condensation of moisture on the inside often obscured vision in the early morning until the temperature had arisen sufficiently to evaporate the moisture.

Another convenient device was a plaster box with a removable glass top. It has long been used by entomologists. In its simplest (and for most purposes quite satisfactory) form this was a plain plaster block about 5×6 inches on its sides and about two inches deep. There was a cavity in this block, the cavity being about 3½×4½ inches on its sides and about one inch deep. A cleaned 4×5 glass photographic negative fitted into a slight depression in the top of the block and closed the cage. We used this device chiefly for ground-inhabiting forms such as centipedes and running beetles. Set on the ground, the plaster absorbed about the right amount of moisture to suit these creatures.

Several of the changes made in this simple plaster box to suit special cases were the presence of a small cavity in which to put water for the purpose of keeping the block quite moist and the presence of a number of large cavities, each connected by small holes through the intervening plaster partitions. The latter change was particularly for keeping ants that need a dark brood-chamber and a light feeding chamber. The brood-chamber was covered, except when visitors were watching the ants, by a piece of pasteboard or thin wood. A label asked the visitors to replace the cover, and they did.

The device which raised the great stir in the Park among the camps that put in Nature Trails of their own was glass "butter-tubs" with plain glass covers. We got a gross of them at a New York 5-and-10-cent store but we must have bought out the market, for when the camps tried to get a supply they not only could not find any but the store asserted that it never had sold such a thing. These "tubs" made first-class small aquaria and were good for other things such as salamanders and snails. However, 5-and-10-cent store glass finger-bowls are about as satisfactory except that they have no covers.

## XIII

**Other Nature Trails**

The development of Nature Trails by the nearby camps in Interstate Park was one of the most pleasing features of our first season and it was entirely unexpected. At the suggestion of Mr. Childs, Park naturalist for 1925, we opened the season by inviting the nature councillors and directors of these camps to a private showing of our experiment. We wished to persuade the camp authorities to send their children to our Trails but these

A party of boys entering the A section of the Training Trail, and a busload of girls leaving for a return to their camp.

good people did more than that. They went back and started Trails of their own.

No definite statistics are available but approximately twenty Trails were in active operation throughout the Park by the end of the season. If these averaged half a mile each, this meant that there were about ten miles of labeled, natural exhibits there. It also probably meant that more than twenty times more people were reached by these Trails than by ours.

More than that, those camps which encouraged their children to help make the Trails, instead of leaving this to paid councillors, did a wonderful work. What better instruction in nature could their children have had?

Can this be done elsewhere? Most certainly; and it is being done. Reference has already been made to the Evander Childs High School Nature Trail in the N. Y. Botanical Gardens. The Manhattan Girl Scouts have made a winter Trail on the Palisades. Word had just been received that Boy Scouts of Rochester are making one there, and so on.

If a many-times-multi-millionaire should offer to build a museum and fill it with not-to-be-surpassed exhibits of local fauna and flora for every community that would take the trouble to label the exhibits, what a philanthropist he would be! He has done it; go to it. The sky is its roof; the sun is its light; and absolutely natural exhibits are at your disposal.

Have you nothing better than a vacant town-lot? Fine! People were very much interested in the exhibit of weeds in our Station garden last year. We simply weeded other weeds away from the weeds to which we wished to call attention and then we told the most interesting things we knew about the weeds we were exhibiting. What about the crickets, the grasshoppers, the ants, the butterflies, and the other insects to be found in any vacant lot; what about the spiders, the slugs, the centipedes the toads, the birds, and so on? Your benefactor may not have given you as large a museum as he has others but it is easy to make it interesting and decidedly instructive.

Fishing and hunting clubs, golf and tennis clubs, and vacation hotels have a wonderful opportunity of adding to the attractiveness of their grounds and at the same time of doing an additional worth-while thing by neat, chatty labels telling about the geology, topography, botany, and zoology of their grounds. Many of them may not have realized that they had those four things, and others, within their bounderies. However, it is probable that each of such clubs and hotels has among its

people some one or more who can and would be glad to do the little work that is required to tell by means of labels the other people about rocks, plants, and animals of various kinds.

There are hundreds, perhaps thousands, of autmobile tourist camps throughout the country. I have stopped overnight in several dozen of them myself, especially when driving from New York to Colorado and back. In them I have seen people from nearly every State and from Canada, all stopping overnight, to be gone the next day and to stop in another camp the next night. What an opportunity to teach natural history at no greater cost than labeling things in and about the camps. One of the most fascinating things on a long automobile trip is the change from one biological region to another and from one type of topography to another. Unfortunately, few have this fascination since no one has pointed it out and explained it to them. The philanthropist of several paragraphs before has provided and stocked these hundreds or thousands of "out-door museums." Henry Ford and others have brought it about that there are millions of visitors to these "museums." Who will do what little remains and label the exhibits? It might be done by individuals but it would be better if it could be done on a national scale so that the story in one camp would connect up with the stories in surrounding camps an average day's drive away.

National and State parks are particularly good fields for Nature Trails and the development of out-door education in such parks is being seriously considered and carried on by intelligent and efficient workers.

However,—and I have saved this point for the prominent final paragraph—the very best way of making a Nature Trail is, it seems to me, to have as many as possible of those whom you wish to teach help to make it. In addition to all of the other advantages of a Nature Trail, this method of making one especially educates those who help, gives them a personal interest in it, and makes each of them a radiating point of interest to others. Here is still another chance for Boy Scouts to "do a good turn," for Girl Scouts, Woodcraft Leagues, womens clubs, Rotary Clubs, public schools, private schools, churches—any organization at all.

Let us teach about nature where nature is.

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